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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/018,020	12/14/2001	Syuichi Izuchi	Y31-138999C/KK	3545

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EXAMINER	
TSANG FOSTER, SUSY N	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/018,020	IZUCHI ET AL.	
	Examiner	Art Unit	
	Susy N Tsang-Foster	1745	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 July 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *20040817*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office Action is responsive to the amendment filed on 7/21/2004. Claims 1, 2, 19, 20 have been amended. Claims 21-29 have been added. Claims 1-29 are pending and are finally rejected for reasons necessitated by applicant's amendment.

Information Disclosure Statement

2. The information disclosure statement filed on 8/17/2004 has been considered by the Examiner.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claims 1, 19, and 20, the newly added limitation "wherein said gel electrolyte in said separator is different than said gel electrolyte in said positive and negative electrodes" is not in

the original disclosure. Furthermore, it is unclear in what manner the gel electrolyte in the separator is different than the gel electrolyte in the positive and negative electrodes.

In claim 21, the limitation "wherein said gel electrolyte in said positive and negative electrodes comprises a polymerized polyfunctional (meth)acrylate monomer which is different than said polymerized polyfunctional (meth)acrylate monomer in said gel electrolyte in said separator" is new matter because the specification only supports that the polyfunctional (meth)acrylate monomer is different in the gel electrolyte of the electrodes than that in the separator. The original disclosure does not support that the polymerized polyfunctional (meth)acrylate monomer in the gel electrolyte of the positive and negative electrodes is different from the polymerized polyfunctional (meth)acrylate monomer in the gel electrolyte of the separator because the difference can be due to molecular weight of the polymerized monomer instead of the identity of the monomer.

In claim 23, the limitation "said positive electrode comprises a positive electrode active material sheet comprising a pressed laminate, and wherein said pressed laminate of said positive electrode is vacuum impregnated with an electrolyte solution comprising a polyfunctional (meth)acrylate monomer which is polymerized to form said polymerized polyfunctional meth(acrylate) monomer of said positive electrode" is not in the original disclosure.

In claim 24, the limitation "wherein said pressed laminate in said positive electrode active material sheet comprises a positive electrode current collector press laminated with a positive composite material" is not in the original disclosure.

In claim 26, the limitation "wherein said negative electrode comprises a negative electrode active material sheet comprising a pressed laminate, and wherein said pressed laminate

of said negative electrode is vacuum impregnated with said electrolyte solution" is not in the original disclosure.

In claim 27, the limitation "wherein said pressed laminate in said negative electrode active material sheet comprises a negative electrode current collector press laminated with a negative composite material" is not in the original disclosure.

With respect to claims 23, 24, 26, and 27, the original specification discloses on pages 11 and 12 that the electrode active material is applied onto the current collector to form the respective positive and negative electrodes and then the positive electrode and negative electrode are laminated with a separator. The individual positive and negative electrodes are not formed by lamination. Furthermore, the term "pressed laminate" does not appear in the original disclosure. In particular, with respect to claim 23, the original disclosure does not support a pressed laminate of positive electrode is vacuum impregnated with an electrolyte solution because page 12 of the specification discloses that the positive electrode active material sheet that is not laminated is dipped in the electrolyte solution so that it was vacuum impregnated with the electrolyte solution, and then subsequently polymerizing the monomer in the electrolyte solution to obtain the positive composite. With respect to claim 26, the specification on the bottom of page 12 discloses that the negative composite was obtained in the same manner and the negative electrode was not laminated prior to vacuum impregnation with the electrolytic solution.

Claims depending from claims rejected under 35 USC 112, first paragraph are also rejected for the same.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1, 19, and 20, the newly added limitation "wherein said gel electrolyte in said separator is different than said gel electrolyte in said positive and negative electrodes" is indefinite because it is unclear in what manner the gel electrolyte in the separator is different than the gel electrolyte in the positive and negative electrodes. For example, what characteristic or characteristics in the gel electrolyte in the separator renders the gel electrolyte thereof different from the gel electrolyte in the positive and negative electrodes?

In claim 21, the limitation "wherein said gel electrolyte in said positive and negative electrodes comprises a polymerized polyfunctional (meth)acrylate monomer which is different than said polymerized polyfunctional (meth)acrylate monomer in said gel electrolyte in said separator" is indefinite because it is unclear how the polymerized polyfunctional (meth)acrylate monomer is different than the polymerized polyfunctional (meth)acrylate monomer. For example, is the difference due to the polyfunctional (meth)acrylate monomer used or is the difference due to the degree in polymerization of the same monomer (e.g. molecular weight of the resulting polymer).

Claims depending from claims rejected under 35 USC 112, second paragraph are also rejected for the same.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniuchi et al. (US Pat. No. 6,013,393) in view of Nishijima et al. (US Patent No. 6,534,214 B1).

Taniuchi et al. disclose a lithium battery comprising a positive electrode, a negative electrode, a separator, and a gel electrolyte comprising a polymerized polyfunctional (meth)acrylate monomer in any one of the negative electrode, positive electrode or separator or a combination thereof (col. 1, lines 40-45; col. 3, lines 1-11; col. 6, lines 56-67; col. 7, lines 1-67; col. 8, lines 1-21).

Specifically, Taniuchi et al. disclose that the gel electrolyte can comprise a polymerized monofunctional or polyfunctional (meth)acrylate (col. 3, lines 8-11). The polyfunctional (meth)acrylate used is a monomer or prepolymer having at least two (meth)acryloyl groups (col. 3, lines 60-67). At least two (meth)acryloyl groups encompass bifunctional, trifunctional, and tetrafunctional metha(acrylate)s. Column 3, lines 12-52 give examples of the monofunctional (meth)acrylate. Specific examples are given for polyfunctional (meth)acrylates in col. 4, lines 1-15, including bi(meth)acrylates, tri(meth)acrylates, and hexa(meth)acrylates. The reference also discloses at column 4, lines 28-30 that any of the mentioned (meth)acrylate monomers may be

used alone or in combination in the present invention. Thus, polyfunctional (meth)acrylate monomers may be used alone.

The reference also discloses that the electrolyte salt component is a sulfonated derivative that can be $LiCF_3SO_3$, $LiN(CF_3SO_2)_2$, $LiC(CF_3SO_2)_3$, and $LiCH(CF_3SO_2)_2$ where each of these sulfonated derivative comprises an organic anion (col. 4, lines 58-60). In addition, inorganic electrolyte salts LiPF6 and LiBF4 are also used in combination with the sulfonated derivative (col. 4, lines 61-67). The concentration of the sulfonated derivative in the nonaqueous solution is normally in the range of 1 to 7 moles/liters and preferably 2 to 5 moles/liters in a nonaqueous electrolytic solution (col. 5, lines 12-20). The amount of inorganic salt used in combination with the sulfonated derivative is preferably in the range of 1 to 9 moles per mole of the sulfonated derivative. When 1 to 7 moles/liter of the sulfonate salt is used, the amount of the inorganic salt can also be 1 to 7 moles/liter to give a total of 2 to 14 moles of lithium salt in the electrolytic solution. When 2 to 5 moles/liter of the sulfonate salt is used, the amount of the inorganic salt can also be 2 to 5 moles/liter to give a total of 4 to 10 moles of lithium salt in the electrolytic solution. Some of the examples in the reference also show (1) 1.8 mol/l of the sulfonated derivative and 0.2 mol/l of $LiBF_4$ (see example 3 at col. 9, lines 45-63) to give a total amount of lithium salt concentration of 2.0 mol/l; and (2) 2.0 mol/l of $LiBF_4$ in comparative example 3 (col. 10, lines 1-12).

The non-aqueous solvent used in the electrolyte can be cyclic esters such as propylene carbonate and ethylene carbonate; chain esters such as dimethyl carbonate and diethyl carbonate; and γ-butyrolactone (col. 5, lines 32-40).

The amount of the non-aqueous electrolytic solution is normally 200 parts by weight or more, preferably in the range of 400 to 900 parts by weight, more preferably in the range of 500 to 800 parts by weight, to 100 parts by weight of a polymer matrix for the ionic conductive polymer gel (polymer gel electrolyte) of the invention of the reference (col. 5, lines 20-32). When the polyfunctional (meth)acrylate monomer is used singly in the polymer matrix, the amount of the monomer would be either 100/(400 +100) x100% to 100/(900 +100) x 100% or **10 wt% to 20 wt% of the total weight of the polymer gel electrolyte**, or 100/(500 + 100) x 100% to 100/ (100 + 800) x 100 wt% or **11wt % to 17 wt% of the total weight of the polymer gel electrolyte**.

Taniuchi et al. do not disclose that the gel electrolyte composition in the separator is different than the gel electrolyte composition in the negative electrodes and positive electrodes.

Nishijima et al. teaches for a lithium battery that uses a gel electrolyte comprising polymethyl methacrylate in the positive electrode, the negative electrode, and the separator and that the gel electrolyte composition in the positive electrode, the negative electrode, and the separator is varied by varying the organic solvent in each of the three components (col. 2, lines 38-60; col. 3, lines 10-67; col. 4, lines 1-42) In particular, it is favorable to have 50% PC and 50% DEC in the positive electrode, 50% EC and 50% DEC in the negative electrode, and 50% gamma-butyrolactone and 50% DEC in the electrolyte of the separator (see Table 1) to give a battery with high output potential, is good in the low temperature characteristics and the load characteristics, is excellent in stability with the high potential and has long life upon inhibiting the deterioration performance even in repeating the charge/discharge cycle (col. 13, lines 1-11 and Table 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the organic solvent in the gel electrolyte of the positive electrode, the negative electrode, and the separator of the lithium battery such that the organic solvent in the gel electrolyte of the positive electrode is 50% PC and 50% DEC, the organic solvent in the gel electrolyte of the negative electrode is 50% EC and 50% DEC, and the organic solvent in the gel electrolyte of the separator is 50% gamma-butyrolactone and 50% DEC (see Table 1) to give a battery with high output potential, is good in the low temperature characteristics and the load characteristics, is excellent in stability with the high potential and has long life upon inhibiting the deterioration performance even in repeating the charge/discharge cycle (col. 13, lines 1-11 and Table 1).

Response to Arguments

9. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (571) 272-1293. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (571) 272-1292.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

st/ Susy Tsang-Foster

Susy Tsang-Foster
Primary Examiner
Art Unit 1745